man will soon obtain compensation for that by holding the body erect and taking proper breathing exercise. The main point is to ascertain our unavoidable injurious conditions, and to arrange the other conditions so that the tendency of the whole is decidedly in our favor, and it will take a well-developed man — and by that I mean a man having a physique between Brent's "medium" and "maximum" standards — but little time and trouble to accomplish that. These directions are very simple, easy to carry out, and in one form or other are within the power of each one of us. But they effect a complete change in the conditions to which the body is subjected, and to make that change with safety it must be slowly, gradually, and uninterruptedly effected.

I will now point out some cases in which physical development is urgently required, and where its adoption will render an immense public service. Take the case presented by the army. Considerable attention has recently been directed to the large amount of inferior physique that is present in the ranks. On the 1st of January, 1889, the army numbered 202,761 men, but of these there were 82,979 whose chest girth was under 36 inches, — that is, from 31 inches up to 36 inches, — and only 16,324 who had a chest girth of 39 inches and upwards. Now on Brent's "medium" standard there ought to have been none under 36 inches, and 67,236 ought to have had a girth of 36 inches and upwards. There is, however, another mode of showing the presence of this inferior physique, and that is by the great liability of the army to disease under ordinary circumstances. During the year 1888 there were 193,233 admitted into hospital, 1,845 died, 2,078 were sent home as invalids, 2,776 were discharged as invalids, and 10,715.97 were constantly non-effective from sickness. It is obvious that had the men been of good physique, and subjected to fairly good conditions, there would not have been anything like this serious amount of sickness, invaliding, and death. Why should not these men be placed in a position to successfully compete with the unfavorable conditions of their surroundings by the introduction of physical development?

A reference to the tables in the supplement to the Registrar-General's report, showing the comparative mortality of those engaged in different trades and occupations, will show the necessity for the diffusion of the knowledge of physical development amongst those engaged therein. Life assurance and sick benefit societies would not only considerably add to their incomes and increase their stability by the recognition of this relationship between conditions and type, but they would also by that very act become powerful agents in the promotion of national physique and public health.

The introduction of physical development as a necessary part of the education of children is urgently and imperatively demanded. They have a splendid type of chest at birth, the proportion of chest girth to height being a little above Brent's "maximum" standard, but under the present system of bringing up children, they are, from the moment of birth, right through the whole course of modern education, submitted to unfavorable conditions, so that for a height of 51.84 inches there is a chest girth of 26.10 inches, instead of one of 35.18 inches, or a loss in about ten years of nearly nine inches. Here you have the best standard of chest girth. Is it too much to ask that the conditions of the child's surroundings, as a whole, shall be so arranged that it may be retained? Look at the poor, puny chests we meet with everywhere, and at the reports of the Registrar General, and then we shall see the grave responsibility that lies upon us for producing such a change and permitting it to continue.

The cases just noted evidently require the introduction of physical development, but where shall we find a man, a woman, or a child in civilized countries upon whom its adoption would not confer a great benefit? We are here face to face with a work so great that it will require all the intelligence, the energy, the influence, and the means of a well-organized body to accomplish it. The workers are here, an important section of the public is ready to co-operate, and the time for action has come. Why should we not have a national association to meet this great national want?

CONTAMINATED WATER SUPPLY FOR LIVE STOCK.[1]

There is no fact better known to the sanitarian than that one of the chief sources of danger to life and health is the contamination of drinking water. If a malignant form of fever makes its appearance in a family, which cannot be explained by the history of actual exposure to contagion, the water supply always comes in for an early and liberal share of attention. The instances are sufficiently numerous in which the investigator is enabled to trace the malady to this source, to warrant every reasonable precaution in procuring a pure water supply. Nor are these facts known to the sanitarian alone. The reading public have been sufficiently enlightened on this subject to enable them to avoid much of the danger from this source.

While we are beginning to take a fairly lively interest in our personal dangers and the methods calculated to avert them, we have yet hardly taken time to consider the economic question of how far our live-stock industry may be affected by the same class of causes. We drill down into the solid rock to procure a water supply of unquestioned purity for family use. We boil, or subject to other purifying means, all suspected samples before they can be used. This is well. But all this time our helpless dumb creatures may be compelled to drink from a shallow slough, foul with decomposing vegetation, or from a surface pond almost at boiling temperature under a summer sun, where the minute forms of animal and vegetable life generate in such profusion as to render the whole a mass of animate slime.

No one who has had a glimpse of the microscopic world would expect a human being to take a draught of such a beverage and live. But our animals are not only expected to live, but to thrive under such conditions. That these expectations are frequently disappointing, I will cite an instance or two in proof. During the latter part of the summer of 1890, I had occasion to investigate a severe outbreak of disease on a farm in one of the counties of Iowa. The animals, including horses, cattle, and pigs, were all affected in the same way. The local symptoms were largely confined to the throat. There was a swelling, partial paralysis of the walls of the air passages, and painful and difficult breathing. The animals attacked uniformly died after an illness of about two days. The disease I could not recognize as belonging to any of the well-defined types with which I was acquainted. Here were horses, cattle, and pigs sick and dying with disease showing the same symptoms in all.

There are few if any of the specific forms of disease that spread, as epizootic, among the widely differing species of domestic animals. I could not classify the disease, and at once set about the task of discovering, if possible, some common source of exposure. The pastures, buildings, and water supply were each in turn subjected to careful scrutiny.

[1] M. Stalker, in the May Bulletin of the Iowa agricultural experiment station.

The buildings were such as are to be found on ordinary Iowa farms, fairly comfortable and clean. I could find no clue in the quantity or quality of feed that promised to lead to a solution of the difficulty.

On investigation of the water supply, I found that most of the animals on the farm drank from a small creek that ran a zigzag course through the premises. The stream was in part supplied from a series of springs, and in ordinary seasons afforded a fair amount of water, which ran, at least for a portion of its course, over a gravelly bed. The dry summer of 1890, with several previous ones showing an abnormally light rain fall, had so reduced the amount of water that it had ceased to run. On making examination and conducting inquiries, I ascertained that it had been the custom on the farm to throw the carcasses of animals down the steep bluffs into the bed of the stream. I further learned that during the summer, chicken cholera had prevailed on the farm, and that a large number of chickens had died and been thrown over the bank. I was also informed that the hog-cholera had caused the death of a considerable number of swine, the carcasses having been treated in a similar manner. The several yards occupied by horses, cattle, pigs, and barn-yard fowls were on the hillside, with abrupt drainage into the creek. In addition to this, large heaps of fermenting manure were deposited about the foot of the hill, near the edge of the stream where the animals went to drink.

A few of the animals on the farm had not had access to the stream, but had been watered from a well. None of these had showed signs of sickness, though they had been in daily contact with those that had their water from the pools in the bed of the stream, and even with some of the sick. On looking up the local geography of the neighborhood, I found that a number of farmers had built their homes along the banks of this stream, and had been accustomed to make use of it in much the same way as the farmer above referred to. Inquiry elicited the fact that on no less than four farms situated on the banks of this stream, animals had died showing symptoms identical with those on the farm first investigated. I regarded the evidence as sufficient to make out a strong case against the impurity of the water, and gave an opinion accordingly.

The above is but a single instance out of many that have come under my observation. It is one of the most glaring, but by no means one attended with the greatest degree of loss On another occasion where a high rate of mortality had prevailed among the cattle running on the open prairie, I was able to trace the cause to contamination of surface water. An animal, dead from anthrax, had been drawn into a basin on the open prairie. Later the rains filled the basin with water, and about one thousand cattle on the range had access to the pond for water supply. The result was that about ten per cent of all the animals having access to the impure water died from anthrax. The teachings of these object lessons are sufficiently obvious. These animals are endowed with organizations not unlike our own, and the manifest laws of being and of health can no more be violated with impunity by them than by ourselves.

THE LAST ENGLISH HOME OF THE BEARDED TIT.[1]

IN the memoir of the Geological Survey of the country round Cromer [England], is a rough sketch-map of the outline of the north-west corner of Europe as in all probability it existed at the newer pliocene period, in the far-off days when the primitive vegetation and monstrous creatures of a still earlier world were slowly giving place to plants and animals of "more of the recent" types.

A great river, since dwindled to the insignificant Rhine, with its mushroom castles and ruins, swept through fir woods and swamps to an estuary hemmed in to the westward by a coast-line unbroken, excepting here and there by a tributary stream, to John o' Groat's, rolling down in its sluggish current stumps of trees, and bones of elephants and bears and beavers, to be washed long ages afterwards from the "forest-beds" of Sheringham and Runton. The swamps through which the old estuary once cut its way lie buried now in places a hundred feet or more deep, beneath Norfolk turnip fields and pheasant coverts.

The fens of the Great Level, which, before Dutch drainers and dyke-builders had reclaimed the second Holland, were perhaps their nearest counterpart in the England of human times, are scarcely less things of the past. The marsh devils, which, until St. Bartholomew interfered and drove them off with a cat-o'-nine-tails, held open court there, and, as Matthew of Paris tells in his "Greater Chronicle," came out in troops to maltreat the few hardy Christian settlers, who, like St. Guthlac, as penance for past wild lives, sought holy retirement there — dragging them, bound, from their cells, and ducking them mercilessly in the black mud, "*cœnosis in laticibus atræ paludis*" — now cower invisible in the ditches, or sneak out as agues, to be ignominiously exorcised with quinine. Hares and partridges have taken the place of spoonbills and bitterns, and ruffs and reves; and, where a few years ago wild geese swam, ponderous Shire cart-colts gallop, scarcely leaving in summer a hoof-mark on the solid ground.

The old order almost everywhere has changed and given place to new. But there is a corner left — the district of the Broads of Norfolk — where one may still see with natural eyes what the world in those parts must have looked like in days before the chalk dam which connected England once with the mainland was — happily for Englishmen of these days — broken through, snapped by a sudden earthquake, or slowly mined by countless generations of boring shellfish, until it gave way under the weight of the accumulating waters of the estuary, choked to the north by advancing ice, or tilted westward by some submarine upheaval. There, with a very small stretch of imagination, one may still hear mastodons crashing through the reed-beds, and British hippopotamuses splashing and blowing in the pools; and, as every now and then an incautious footstep breaks through the raft-like upper crust of soil, and imprisoned gases bubble up, one may, without any stretch of imagination, smell the foul stenches of pliocene days.

The climate in those days, geologists tell us, judging by the fossil plants of the time, must — before the country was wrapped in ice — have been much what it is in Norfolk now. "If the various sections of the upper fresh-water beds are examined, we find," writes Mr. Clement Reid, who surveyed the country round Cromer, where the forest-beds are most exposed, "that all appear to have been formed in large shallow lakes like the present broads, or in sluggish streams connected with them."

Three considerable rivers, the Bure, the Waveney, and the Yare, after meandering through level meadows and marshes, — none of the three, according to Sir John Hawkshaw's estimate, with a fall of more than two inches in the mile, — join and meet the full strength of the tide in Breydon Water. The outflow is checked, and the volume of the streams, finding no other way to dispose of itself, has spread out into side-waters and back-waters, wherever the law of levels, the only law to which it owns allegiance, has admitted the right of way.

The result is a triangle of some fifteen or twenty thousand acres or more in which — as in the abyss through which Satan winged his way in search of the newly created world,

> "Where hot, cold, moist, and dry, four champions fierce,
> Strove for the mast'ry"—

land and water hold divided empire. In places the water seems at the first glance to be carrying all before it. Broad sheets (some of them a hundred acres or more) spread almost unbroken surfaces over unfathomable depths of mud. But the encircling rings of rushes, dwarf alders, and other multitudinous marsh plants,

[1] T. Digby Pigott, in the Contemporary Review for July.